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longitudinal axis, and said first separation channel being configured to contain an electrolyte solution within the interior channel volume, said separation channel providing a common flowpath for both the analyte sample and the electrolyte solution;

- a continuous electric field intensity gradient generator, further comprising a continuously variable resistor disposed adjacent said separation channel, said continuous electric field intensity gradient generator being configured to apply a electric field intensity gradient within the first separation channel along the longitudinal axis over at least a portion of the first separation channel intermediate the first and second ends, the intensity of electric field generated varying as a continuous function of location along the longitudinal axis, whereby electrophoretic migration of an analyte species within the first separation channel is actuated by a force that varies with position along the longitudinal axis as a continuous function of position along the longitudinal axis within said portion of the first separation channel;
- a fluid flow generator configured to generate a fluid flow along the longitudinal axis of the first separation channel, which flow is controllable and is configured to provide a force on the analyte species acting in opposition to the electric field intensity gradient, to enhance separation of said at least one analyte species by enabling separation control of an interaction of forces created by the continuous electric field intensity gradient generator and the fluid flow generator.

**58.** A system in accordance with claim **57**, wherein the fluid flow generator further comprises a pump fluidly connected to the separation channel, said pump being configured to provide a pump-induced fluid flow through the separation channel to provide a counter-balancing hydrodynamic force.

**59.** An electromobility focusing separation system configured to separate analyte species in a fluid sample containing at least one analyte species, comprising:

- a first separation channel defined by a containment forming a first elongated separation channel chamber having a longitudinal axis and first end and a second end, said containment configured to contain the fluid sample in the first elongated separation channel chamber,
- an electrolyte solution contained within the first separation channel
- an anode adjacent and in fluid communication with the first end of the first elongated separation channel chamber,

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a cathode adjacent and in fluid communication with the second end of the first elongated separation channel chamber,

a first power supply in electric communication with the anode and the cathode and configured to provide an electrical potential there between, whereby electrophoretic migration of analyte species is enabled,

a sample injection port coupled to the separation channel, the sample injection port being in fluid communication with the electrolyte solution and enabling injection of a fluid sample containing one or more analyte species into the electrolyte solution,

a resistor disposed parallel and in fluid communication with the first elongated separation channel chamber along at least a portion of said first elongated separation channel chamber intermediate the first and second ends thereof, said resistor having a variable resistance varying as a function of position along the longitudinal axis of said first elongated separation channel chamber; and,

a fluid flow generator configured to provide a relative counter bulk flow of the electrolyte solution,

whereby electrophoretic migration of analyte species is effected by an electric field intensity which varies as a continuous function of position along the longitudinal axis of said first elongated separation channel chamber at locations adjacent the resistor, and electrophoretic migration of analyte species and bulk flow of the electrolyte solution can combine to separate analyte species along the longitudinal axis of the first elongated separation channel.

**60.** A system in accordance with claim **59**, wherein the fluid bulk flow generator comprises a electric field generator configured to create and control the direction and velocity of an electro-osmotic bulk flow of the electrolyte solution, said containment and said electrolyte solution cooperating to provide a charge accumulation at interior wall surfaces of the first elongated separation channel chamber in response to an applied potential so as to give rise to bulk electro-osmotic flow of the electrolyte solution.

**61.** A system in accordance with claim **59**, wherein the fluid bulk flow generator comprises a pump configured to provide a pump-induced flow providing a counter acting force to the electrophoretic migration of analyte species.

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